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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/749,986

12/31/2003

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EXAMINER

DUPUIS, DEREK L

ART UNIT

PAPER NUMBER

2883

MAIL DATE

DELIVERY MODE

06/05/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/749,986

Applicant(s)

GARDNER ET AL.

Examiner

Derek L. Dupuis

Art Unit

2883

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 32,35-43,45,47-50,56,57 and 62 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 32,35-43,45,47-50,56,57 and 62 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 32, 35-43, 45, 47-50, 56, 57, and 62 have been considered but are moot in view of the new ground(s) of rejection.

2. The new grounds of rejection was necessitated by applicant's substantial amendment.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 35 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claim 35 recites the limitation "An apparatus as claimed in claim 33" in line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim. Claim 33 was cancelled. The scope of claim is unclear since "an apparatus as claimed in claim 33" is undefined and indefinite.

6. For the purposes of examination, the examiner has interpreted this limitation to reference claim 32.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 32, 35-43, 45, 47-50, 56, and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Garito et al (US 6,876,796 B2)* in view of *LoCascio et al (US 2003/0016907 A1)* in view of *Moulton et al (US 5,774,489)* and in further view of *Scherer et al (US 2004/0146431 A1)*.

9. Regarding claims 32, 35, 40-43, 45, 47, 50, 56, and 62, Garito et al teach an apparatus comprising a silicon substrate (100) and a microresonator (50) disposed on the substrate. The microresonator has an annular structure to recirculate light at a desired wavelength (see column 4, lines 53-57 and column 14, lines 9-23). Garito et al teach that the microresonator includes nanocrystals and a rare earth in a matrix (see column 1, lines 10-13, column 2, lines 40-61, column 4, lines 45-57, column 9, lines 11-25, and column 15, lines 53-60). Garito et al teach that the nanocrystals can include Si or SiGe (see column 8, line 61 to column 9, line 10) and that the matrix can be aluminosilicate (see column 2, line 66 to column 3, line 6). Garito et al teach that the rare earth to be included in the matrix can be any rare earth known to one skilled in the art (see column 9, lines 22-25). Erbium and Ytterbium are known rare earths.

10. Garito et al do not teach that the device includes a pump to excite circulation of light in the microresonator. LoCascio et al teach a microresonator that is optically pumped vertically from above to excite circulation in the microresonator. Through the optical pumping, LoCascio is able to selectively resonate a wavelength in the microresonator (see paragraph 81). LoCascio et al also disclose a microresonator coupled to a plurality of patterned waveguides (106 and 107) that are formed on the substrate. The waveguides are vertically coupled to the microresonator at a location below the microresonator as can be seen in figure 12. LoCascio et al also teach that the apparatus includes a thin film with a thickness disposed between the patterned waveguides

(106 and 107) and the microresonator (see paragraph 80). Since LoCascio et al teach that the pump source is located above the microresonator, the film is also between the pump source and the microresonator. LoCascio et al teach that the microresonator and the waveguides are in contact with one another (see figure 12). This range is less than 250 nanometers. LoCascio et al do not explicitly state that the waveguides are located above the microresonator. However, it would have been obvious to one of ordinary skill in the art to place the waveguides above the microresonator (instead of below) since it has been held that the rearranging of parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70.

11. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the device of Garito et al to include pumping as taught by LoCascio et al. Motivation to do this would be that the nanocrystal arrangement used by LoCascio allows for controlling and “altering the resonant condition of the microcavity” through the illumination provided by the pump source (see paragraph 26). This allows the resonator to resonate wavelengths of any size (see paragraph 52).

12. Garito et al and LoCascio et al do not explicitly state that an LED is used as the pump source to pump the microresonator. Moulton et al teach that LEDs can be used to optically pump a medium and that this is routine in the art. See column 1, lines 10-27. The LEDs are capable of pumping below 900nm and are low power LEDs (see column 5, lines 25-40).

13. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the device taught by Garito et al in view of LoCascio et al to include an LED pump source as taught by Moulton et al. Motivation to do this would be pump efficiency of LEDs is higher (see column 1, lines 10-27).

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14. Neither Garito et al, LoCascio et al, or Moutlon et al teach that the substrate includes CMOS circuitry. Scherer et al teach a microresonator disposed on the same surface as CMOS circuitry.

15. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the apparatus as taught by Garito et al in view of LoCascio et al in view of Moutlon et al to include CMOS circuitry as taught by Scherer et al. Motivation would be to enable detailed analysis of the signals propagated in the microresonator using CMOS electronics (see paragraph 37 of Scherer).

16. Regarding claims 36-39, 48, and 49, Garito et al in view of LoCascio et al in view of Moulton et al and in further view of Scherer et al teach a device as discussed above in reference to claims 32 and 45 respectively. Garito et al teach that the annular structure can be a ring or a disk (see column 14, lines 9-37). Garito et al teach that the optical energy within the microresonator can be resonant in a standing wave mode (see column 14, lines 9-37)). By definition, a microresonator where the energy is resonant in a standing wave mode is inherently has a circumference that is an integer multiple of the wavelength of the optical signal. The length from the center of the disk to the center of the waveguide forming the disk is, by definition, the radius of the disk. Therefore, radius of the disk is proportional (by  $2\pi$ ) to the circumference which is an integer multiple of the wavelength of the optical signals being resonated in the microresonator. By definition, a disc structured microresonator where the energy is resonant in a standing wave mode inherently has a perimeter that is an integer multiple of the wavelength of the optical signal.

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17. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Garito et al (US 6,876,796 B2)* in view of *LoCascio et al (US 2003/0016907 A1)* in further view of *Moulton et al (US 5,774,489)*.

18. Regarding claim 57, Garito et al teach an apparatus comprising a silicon substrate (100) and a microresonator (50) disposed on the substrate. The microresonator has an annular structure to recirculate light at a desired wavelength (see column 4, lines 53-57 and column 14, lines 9-23). Garito et al teach that the microresonator includes nanoparticles and a rare earth in a matrix (see column 1, lines 10-13, column 2, lines 40-61, column 4, lines 45-57, column 9, lines 11-25, and column 15, lines 53-60). Garito et al teach that the particles can include Si or SiGe (see column 8, line 61 to column 9, line 10) and that the matrix can be aluminosilicate (see column 2, line 66 to column 3, line 6).

19. Garito et al do not teach that the device includes a pump to excite circulation of light in the microresonator. LoCascio et al teach a microresonator that is optically pumped vertically from above to excite circulation in the microresonator. Through the optical pumping, LoCascio is able to selectively resonate a wavelength in the microresonator (see paragraph 81). LoCascio et al also disclose a microresonator coupled to a plurality of patterned waveguides (106 and 107) that are formed on the substrate. The waveguides are vertically coupled to the microresonator at a location below the microresonator as can be seen in figure 12. LoCascio et al do not explicitly state that the waveguides are located above the microresonator. However, it would have been obvious to one of ordinary skill in the art to place the waveguides above the microresonator (instead of below) since it has been held that the rearranging of parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70.

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20. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the device of Garito et al to include pumping as taught by LoCascio et al. Motivation to do this would be that the nanocrystal arrangement used by LoCascio allows for controlling and “altering the resonant condition of the microcavity” through the illumination provided by the pump source (see paragraph 26). This allows the resonator to resonate wavelengths of any size (see paragraph 52).

21. Garito et al and LoCascio et al do not explicitly state that an LED is used as the pump source to pump the microresonator. Moulton et al teach that LEDs can be used to optically pump a medium and that this is routine in the art. See column 1, lines 10-27.

22. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the device taught by Garito et al in view of LoCascio et al to include an LED pump source as taught by Moulton et al. Motivation to do this would be pump efficiency of LEDs is higher (see column 1, lines 10-27).

### ***Conclusion***

23. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek L. Dupuis whose telephone number is (571) 272-3101. The examiner can normally be reached on Monday - Friday 8:30am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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